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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/394,647	09/08/99	GAUTIER J	2988-0651

020583
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IM22/0702

EXAMINER	
SODERQUIST,A	
ART UNIT	**PAPER NUMBER**
1743	4

DATE MAILED: 07/02/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/394,647	Applicant(s) Gautier et al.
	Examiner Arlen Soderquist	Art Unit 1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-10 and 12-20* is/are rejected.

7) ☒ Claim(s) *11* is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 3

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1, 3-6, 12-14 an 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiswell (*Anal. Chim. Acta* hereinafter referred to as Chiswell-1) in view of Chiswell (*Analyst* hereinafter referred to as Chiswell-2). In the paper Chiswell-1 teaches Acid Yellow 17 as a spectrophotometric reagent for the determination of low concentrations of residual free chlorine. Recommended spectrophotometric procedures for chlorine are investigated and are found to have significant disadvantages, thus a new method for the spectrophotometric determination of free chlorine in the presence of other chlorine species, viz, chlorine dioxide, chlorite, chlorate and combined chlorine, based on Acid Yellow 17, has been developed. Only chlorine dioxide interferes. The detection limit is 50 ng mL^{-1} for free chlorine, and the calibration graph is linear up to at least 1.0 $\mu g\ mL^{-1}$. Cyclic voltammetry has been used to explain the findings of the spectrophotometric work. it is clear from page 520 that a borate buffer was used. The structure of the azo dye is shown in figure 3. The interaction between free chlorine (OCl^-) or chlorine dioxide and the dye is shown in figure 4. Chiswell-1 does not teach the presence of a masking agent or the measurement of chlorine dioxide by the azo dye.

Chiswell-2 teaches the use of Lissamine Green B as a spectrophotometric reagent for the determination of low residuals of chlorine dioxide. A method for the spectrophotometric

determination, using Lissamine Green B, of ClO_2 in the presence of other Cl species, i.e., free Cl, ClO_2-, chloramine and ClO_3-, was developed. The method overcomes the major problem found with the commonly used N,N'-diethyl-p-phenylenediamine method for determining ClO_2, namely interference from free and combined Cl. The detection limit of the proposed method is 0.03 ± 0.01 ppm of ClO_2; the calibration graph is linear in 0-0.5 ppm ClO_2, and the method was verified by cyclic voltammetry. Figure 4 and its description on page 659 show that in a borate buffer free chlorine and chlorine dioxide both interact with the dye. To overcome this problem Chiswell-2 teaches that ammonia is the most successful masking agent for free chlorine.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate ammonia as a free chlorine masking agent as taught by Chiswell-2 into the reagent and method of Chiswell-1 because of the desire to measure chlorine dioxide residuals and the ability to mask the effects of free chlorine as shown by Chiswell-2. Concentrations and methods of preparation would have been results effective variables that the Court has held to be within the skill of one of ordinary skill in the art (*In re Boesch*, 205 USPQ 215 (CCPA 1980)).

3. Claims 2, 7-10 and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiswell-1 in view of Chiswell-2 as applied to claim above, and further in view of Ehata, Gordon and Hofmann. Chiswell-1 does not teach the specific dyes or metal chelators as part of the reagent.

In the published application Ehata teaches a detector for chlorine leakage from a tap water purifying apparatus. The leakage of Cl into tap water from a purifying apparatus is monitored with a detector obtained by loading an indicator, e.g., a food dye, into a polymer, e.g., a cation exchanger. The detector is stable for use for long periods of time and the indicator is not eluted by flowing tap water. Thus, a 0.5-cm wide and 1-cm long Selemion Cl-type cation exchanger membrane was immersed in 100 mL solution containing 10 μg/mL food dye for 2 days. The food dye used was Amaranth, New coccine, Tartrazine, Sunset yellow, Fast green, Brilliant blue, or Indigo carmine. The immersed membrane was washed with distilled water and dried by placing it between filter papers to give each detector. Each detector was immersed in 20 mL solution

containing 4 ppm Cl for 4 h and each detector except that containing Fast green was colorless. It is noted that the first 4 dyes are azo dyes.

In the paper Gordon teaches eliminating interferences when measuring multiple disinfectants/oxidants using masks, kinetics, and FIA. A technology that shows great promise for treating drinking water is to apply multiple disinfectants/oxidants. The analytical chemistry methods needed to monitor and control treatment systems using multiple oxidants have not been fully developed. A common problem originates from the fact that many of the available methods are adaptations of chlorine methods and do not measure individual species, rather, the concentration of the various species are determined by difference. When a disinfectant/oxidant is present in high concentration, the existence of numerous intermediates is possible. These species are generally difficult to isolate and identify because of their rapid reaction and interactions. In certain cases, chemical masks can be used to improve the selectivity of an analysis method by isolating reactive species (see table 2). Kinetic methods based on the reaction rate differences of oxidants with a reagent can also be used to identify and/or quantify multiple oxidant species.

In the paper Hofmann presents a comparison of spectrophotometric methods for measuring chlorine dioxide in drinking water. The recognition that chlorine disinfection of drinking water may not be effective in controlling such as Cryptosporidium may lead to the greater use of stronger alternative disinfectants, such as chlorine dioxide. Typical chlorine dioxide residual concentration requirements for disinfection may extend to less than 0.1 mg L^{-1}, thus requiring very good quantitation methods for optimal process control. Traditional methods have been cumbersome and sometimes inaccurate. This study examined three spectrophotometric methods for measuring chlorine dioxide in the <0.1 mg L^{-1} to 2 mg L^{-1} range, using acid chrome violet K (ACVK), lissamine green B (Chiswell-2), and amaranth reagents. Each methods was assessed using both laboratory reagent water and various natural waters to identify the respective linear range, method precision, and the possible interference from natural color due to aqueous organic matter. Interferences arising from the presence of chlorine, chloramines, chlorite, chlorate, and permanganate were also evaluated, along with potential need to correct for

temperature changes. The several reagents are shown in figure 2 and it is noted that the amaranth method uses a buffer that is similar to the Chiswell-2 method.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the dyes and chelating agents taught by Ehata, Gordon and Hofmann into the Chiswell-1 reagent and method because of their known sensitivity to the detected substance and their use for similar analyses.

4. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The art of record does not teach or fairly suggest the use of Evans blue in a reagent or method for measuring chlorine dioxide.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional references are related to compounds, devices and methods of measuring chlorine species in water.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner can normally be reached from about 5:30 AM to about 3:00 PM on Mondays and from about 7:30 AM to about 5:00 PM on Tuesday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Another number for official papers is (703) 305-3599. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Arlen Soderquist

June 28, 2001

ARLEN SODERQUIST
PRIMARY EXAMINER